

by Josef Idoine

## American Lobster

The American lobster, *Homarus americanus*, is distributed in the Northwest Atlantic from Labrador to Cape Hatteras, from coastal regions out to depths of 700 m (400 fathoms). Lobsters are locally abundant in coastal regions within the Gulf of Maine and off southern New England. Coastal lobsters are concentrated in rocky areas where shelter is readily available, although occasional high densities occur in mud substrates suitable for burrowing. Offshore populations are most abundant in the vicinity of submarine canyons along the continental shelf edge. Tagging experiments in coastal waters suggest that small lobsters undertake rather limited movement, although larger individuals may travel extensively. In contrast, offshore lobsters show well-defined shoalward migrations during the spring, traveling as much as 300 km (186 mi), regularly 80 km (50 mi). Lateral movements along the shelf edge have been demonstrated as well. For assessment purposes, three stock areas- the Gulf of Maine, Georges Bank and South, and South of Cape Cod to Long Island Sound-have been recognized, based on differences in biological attributes and exploitation patterns.

Lobsters exhibit a complex life cycle in which mating occurs following molting of the female. Eggs (7,000 to 80,000) are extruded and carried under the female's abdomen during a 9 to 11 month incubation period. The eggs hatch during late spring or early summer and the pelagic larvae undergo four molts before attaining adult characteristics and settling to the bottom. Lobsters molt approximately 20 times (in 5 to 8 years) before reaching minimum legal size. A significant proportion of the female lobsters caught in inshore areas are not sexually mature.

The principal fishing gear used to catch lobsters is the trap. Lobsters are also taken as bycatch with otter trawls. Recreational fishing occurs in coastal waters, but estimates of the catch are not available. Foreign fishing is insignificant. The offshore fishery is managed under the New England Fishery Management Council's Lobster Fishery Management Plan, while fisheries within 3 mi of shore are managed by the various states under the Atlantic States Marine Fisheries Commission's Interstate Fishery Management Plan for American Lobster. Primary regulatory measures include carapace length (CL) limits, protection of ovigerous females, and gear restrictions and nominal effort control measures.

Total landings averaged 17,600 mt from 1977-1986 and then increased to 28,900 mt in 1991 before declining slightly in 1992- 1993. Landings for 1995 and 1996 were 31,900 mt and 32,600 mt, respectively.

Landings in the U.S. inshore fishery were relatively stable from 1965 to 1975, ranging from 10,300 to 12,200 mt, and averaging 11,100 mt. Landings then rose steadily from 12,900 mt in 1978 to a record 24,000 mt in 1991. After declining somewhat in 1992-1993, the upward trend continued, with landings reaching 29,200 mt in 1996. This increase can be attributed both to increased abundance and a continuing increase in effort, especially in the number of pots and extent of area fished.

Prior to 1950, lobsters were taken offshore primarily as incidental trawl catches in demersal fisheries. Reported offshore lobster landings increased dramatically from about 400 mt during the 1950s to an average of more than 2,000 mt in the 1960s. In 1969, technological advances permitted the introduction of

trap fishing to deeper offshore areas. Landings from offshore traps rose from 50 mt in 1969 to 2,900 mt in 1972 and remained relatively stable at around 2,000 mt from 1975 to 1983.

From 1985 through 1989 trap landings averaged around 2,800 mt. At the same time, trawl landings decreased from a peak of 3,200 mt in 1971 to 500 mt in 1984. In subsequent years the trawl component of the fishery has averaged a little over 300 mt. Total offshore landings rose to an average of around 3,200 mt in the late 1980s, peaked at 5,000 mt in 1990 and have since declined to 3,200 mt in 1996, 10 percent of the U.S. total. Offshore landings have never comprised more than 20 percent of U.S. total landings.

In both inshore and offshore fisheries, the great majority of lobsters landed are within one molt of the minimum size, representative of a continuing dependency on newly recruited animals (i.e., those lobsters that have just grown into legal size). Even on Georges Bank in recent years, over 80% of the females are within this newly recruited category. These animals are not even 50% mature at these sizes, and therefore have not, on average, had a chance to reproduce. In Canada, the Scotia-Fundy region has experienced similar trends in landings over the past decade.

The NEFSC autumn bottom trawl survey biomass index declined from 1.3 kg per tow in 1964 to an average of about 0.6 kg from 1970 -1975. The index then increased to an average of 0.8 kg per tow from 1979-1984. Since then, the index declined somewhat in the late 1980s, but then increased to 1.3 kg per tow in 1996. These trends in biomass indices and offshore landings are consistent in indicating a reduction in stock biomass following the development of the offshore fishery, followed by stabilization of the stock and subsequent increases in abundance. In recent years, other evidence of increases in abundance have been seen throughout the lobster's range.

During the past decade, areal expansion of the lobster fishery, landings from both inshore and offshore and the continued intense inshore fishery have called into question the relationship between animals in these areas. If consistent recruitment in coastal areas depends on egg production from offshore, heavy exploitation of offshore populations could impact all fisheries. It would be prudent to view lobsters from both areas as a unit resource.

The overfishing definition adopted by the New England Fishery Management Council refers only to females, based on maximum spawning potential expressed in terms of egg production. Assessment results indicate that all three stock areas are overexploited. This conclusion is supported not only by estimates of fishing mortality and associated egg production, but other population metrics. The proportion of landings that are new recruits (i.e., just molted into legal size) has ranged from around 80% for the Georges Bank and South region to 90% in the Gulf of Maine and nearly 98% in the South of Cape Cod to Long Island Sound area. The effectiveness of current management measures has been reduced by high mortality rates and the resultant severely truncated size composition. Any change in environmental conditions that would cause a major disruption in a year's molt, or worse, a reduction in spawning or survival from egg to adult stage, could have serious consequences for the resource. Substantial immediate reductions in effort and the initiation of other management measures are required to rebuild stock biomass and size/age composition so as to lessen dependence of the population and the fishery on incoming recruitment.

#### **For further information**

Fogarty, M.J., R.A. Cooper, J.R. Uzmann, and T.S. Burns. 1982. Assessment of the USA offshore American lobster, *Homarus americanus*, fishery. ICES [International Council for Exploration of the Sea] C.M. 1982/K:13.

NEFSC [Northeast Fisheries Science Center]. 1996. [Report of the] 22nd Northeast Regional Stock Assessment Workshop (22nd SAW), Stock Assessment Review Committee (SARC), consensus summary of assessments. Woods Hole, MA: NOAA/NMFS/NEFSC. NEFSC Ref. Doc. 96-13.

## Tables

### American Lobster

Long-term potential catch	=	Unknown
SSB for long-term potential catch	=	Unknown
Importance of recreational fishery	=	Minor
Management	=	American Lobster FMP/NEFMC Interstate FMP for American Lobster (ASMFC)
Status of exploitation	=	Overexploited
Size at 50% maturity	=	7.8-10 cm (3.1 - 3.9 in.) carapace length
Assessment level	=	Size structured (DeLury)
Overfishing definition	=	10% egg production per recruit
Fishing mortality rate corresponding to overfishing definition	=	F10% = 0.32 <sup>1</sup> F10% = 0.36 <sup>2</sup> F10% = 0.44 <sup>3</sup>
M = 0.10	Fmax (females) = 0.24 <sup>1</sup>	F <sub>1989-1991</sub> = 0.621
	= 0.15 <sup>2</sup>	F <sub>1988-1990</sub> = 0.502
	= 0.33 <sup>3</sup>	F <sub>1989-1991</sub> = 1.213

<sup>1</sup>Gulf of Maine

<sup>2</sup>Georges Bank and South

<sup>3</sup>Southern Cape Cod - Long Island Sound

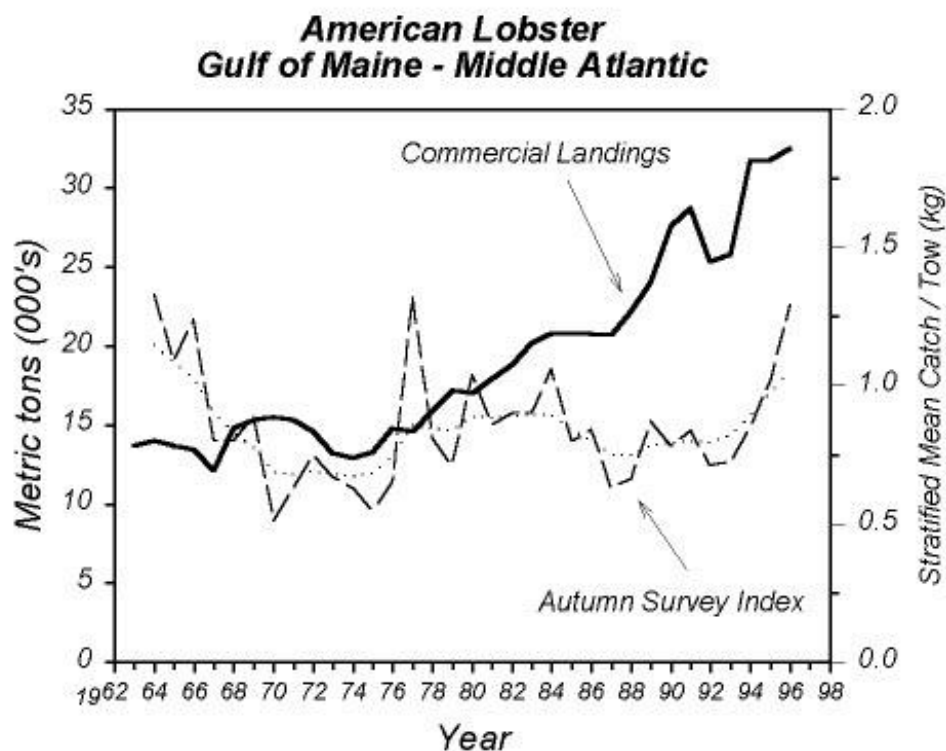


Table 29.1 Commercial and recreational landings (thousand metric tons), live weight).  
Landings statistics have been revised to reflect unreported catches.

Category	1977-86 Average	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
U.S. recreational <sup>1</sup>	-	-	-	-	-	-	-	-	-	-	-
Commercial											
United States											
Offshore <sup>2</sup>	2.9	3.3	3.0	3.3	5.0	4.7	4.4	3.5	3.8	4.4	3.2
Inshore <sup>3</sup>	14.5	17.3	19.2	20.7	22.6	24.0	20.9	22.1	27.9	27.3	29.2
Canada-Georges Bank	0.2	<0.1	<0.1	<0.1	0.1	0.2	0.2	0.2	0.2	0.1	0.1
Total nominal catch	17.6	20.7	22.2	24.0	27.7	28.9	25.5	25.8	31.9	31.9	32.6

<sup>1</sup>Recreational catches unknown

<sup>2</sup>Includes trawl and offshore trap catches

<sup>3</sup>Inshore trap catches